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SYSTEMS AND PROCEDURES QUARTERLY

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A Single-Column General Ledger Account Form

Saves time and space—represents an improvement in keeping with other advances in accounting.

by Howard C. Greer

IN MOST companies of any considerable size, the general ledger has become a "summarization" record, consisting principally of a series of "control" accounts, with all analytical detail relegated to supporting records of various kinds. The function of the general ledger in such cases is to provide an orderly permanent record of all transactions, in the form of periodic totals by major categories, with "balances" representing the cumulative net effect of all the transactions affecting each class of assets and equities.

In general ledgers of this type, each account usually contains only one entry in each period for each class of transaction. Where the procedure has been carefully systematized, all postings may come from a series of scheduled journal entries covering all ordinary transactions, arranged and numbered in such a manner that they become self-identifying (e.g. JE 1, Cash Receipts; JE 2, Cash Disbursements; JE 3, Vouchers Payable; and so on).

While these developments have changed completely the character of the typical ledger account, there has been no corresponding change in the typical ledger account form. Most general ledgers consist of sheets designed long ago to provide for account details of a very different nature.

The characteristic ledger account form in common use is substantially the same as the form adopted in an earlier era to record particulars of accounts which were largely of a "personal" character. Predominant in the old general ledger were the accounts with vendors, vendees, financial institutions, partners, employees, and others, in which the balance owed or owing was the primary objective of the accounting, and the number, date, amount, and character of individual transactions were likely to be the subjects of most frequent interest.

The account form useful for this purpose was adapted quite successfully to the recording of such in-and-out asset and liability accounts as those for inventories, prepayments, and accruals, and with less effectiveness (but no great difficulty) to such normally "one-sided" accounts as those for fixed assets, revenues, expenses and capital.

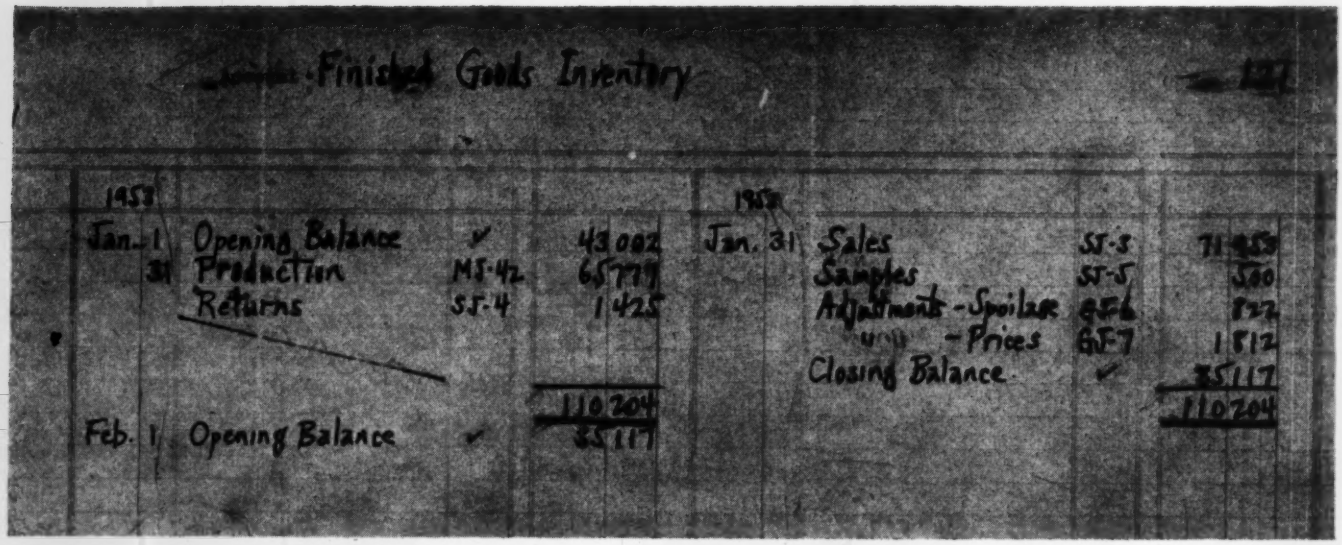
Ledger account forms of several kinds are available from commercial stationers, but most of them embody the following elements, arranged in various relationships and occupying various portions of the page, as illustrated in Exhibit A:

(1) A debit section, consisting of ruled columns of widths, to be used for (a) date, (b) item description, (c) journal reference, (d) amount

(2) A credit section of like size, form and content

Variants have the amount columns adjacent, occasionally an additional column for recording account balances, and sometimes other features, but most do not differ in essentials from the one illustrated.

The use anticipated for this form is indicated by the sample figures inserted in the illustration. This thorough, orderly, explicit exposition of all the facts about the account is the model held up for the classical bookkeeper, and thousands of earnest young students are doubtless toiling today through "practice sets" in which this



Finished Goods Inventory — 127

1953				1953			
Jan. 1	Opening Balance	✓	43 002	Jan. 31	Sales	SJ-3	71 953
31	Production	MJ-42	65 777		Samples	SJ-5	500
	Returns	SJ-4	1 425		Adjustments - Spoilage	GJ-6	822
					" - Prices	GJ-7	1 812
					Closing Balance	✓	35 117
			110 204				110 204
Feb. 1	Opening Balance	✓	35 117				

Exhibit A

account form is presented as a standard and an ideal. The fact that, in general ledger bookkeeping, no one should (and hardly anyone does) keep accounts this way, will not be discovered by the student until later.

How does actual general ledger accounting differ? Well, of course, almost no one today has time to enter pen-and-ink totals, rule off accounts, and "bring down" balances at the end of each month. Many bookkeepers, alas, don't even do it at the end of the year. They insert column totals in small penciled figures in between two lines, and make a penciled memo notation of the balance in the description column or in some other available space.

Furthermore, they seldom use the description column for any actual item descriptions, presuming (rightly) that reference usually will be made to the original entry itself, if anyone is interested in the nature of the transaction, or that the journal voucher number or sequence will adequately identify the item. In the date column, the only notation made (or needed) is the name or abbreviation of the month, because in modern practice all general ledger entries are made as of the monthly closing date.

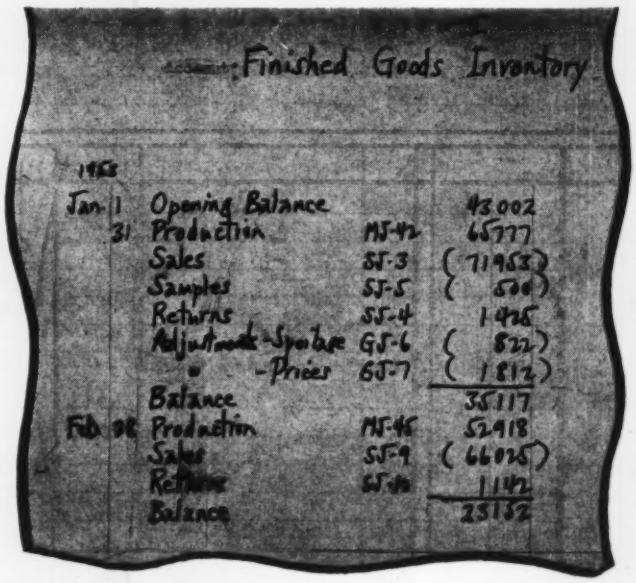
It is apparent from the above that the typical ledger account form is not particularly well adapted to its normal uses. There is no convenient provision for disclosing in a prominent and logical place the essential figure to which the whole calculation is directed—the balance of the account. There is not even any good spot for entering column totals, a pre-requisite to, and proof of the "balance" computation.

On the other hand, probably more than half of the average ledger sheet is completely wasted (i.e. left blank). This is partly because the usually wide "description" column is mostly unused, and partly because an increasing proportion of general ledger accounts are "one-sided" (i.e. consisting of all debits or all credits, with a "contra" side containing little or nothing). Wasted space, it may be noted, not only costs money, but is objectionable from the standpoint of weight and bulk—most ledgers are too heavy to be carried around comfortably, and filing space is expensive.

How can the typical general ledger account form be improved? A more economical, efficient, and convenient form should differ from the conventional type through incorporation of the following essential characteristics:

1. Limitation of column space to the minimum required for noting merely the date (month), reference

Exhibit B



Finished Goods Inventory

1953				
Jan. 1	Opening Balance			43 002
31	Production	MJ-42		65 777
	Sales	SJ-3		(71 953)
	Samples	SJ-5		(500)
	Returns	SJ-4		1 425
	Adjustments - Spoilage	GJ-6		(822)
	" - Prices	GJ-7		(1 812)
	Balance			35 117
Feb. 28	Production	MJ-45		52 918
	Sales	SJ-9		(66 025)
	Returns	GJ-11		1 142
	Balance			23 152

(journal voucher number), and amount of each posting.

2. Provision of specific spaces for writing in periodic account balances in some orderly, permanent and readily identifiable form.

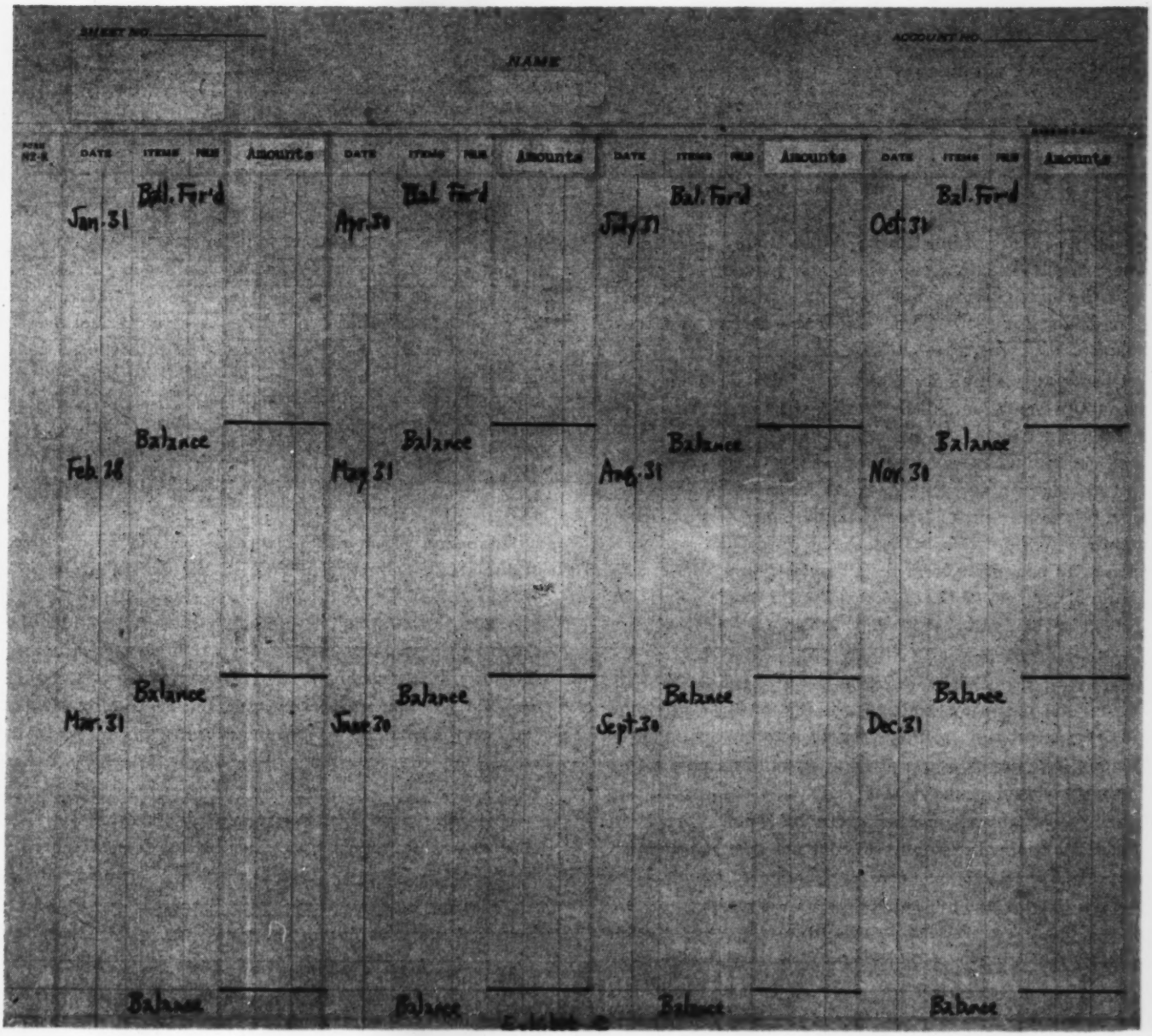
3. Arrangement of postings in a manner which will facilitate determination of account balances, with the fewest possible intermediate calculations and notations.

This last feature of the record-keeping deserves special consideration. The almost universal practice in maintaining ledger accounts is to post debits and credits in separate columns, foot each column, and subtract the smaller footing from the larger to determine the balance. For each "two-sided" account this requires two additions followed by a subtraction of two pencil totals not juxtaposed or otherwise arranged to facilitate the calculation.

Both machine computation work and commercial arithmetic have progressed to a point where this type of calculation is definitely outmoded, as cumbersome, time-consuming, and unnecessary. Anyone who is quick with figures soon learns to perform additions and subtractions in a continuous sequence, without separately adding the plus and minus elements and subtracting the totals. Any bright clerk can be taught to do this, and of course computing machines do it automatically.

Why, then, list debits and credits in separate columns, for separate addition and ultimate total-subtraction? Why not list both kinds of items in a single column, in inks of contrasting colors or with other distinguishing iden-

Exhibit C



		Credits						
	No.	Und. 1	1-2	2-3	3-4	4-5	Ov. 5	Totals
	Und. 1	33	19	-	-	1	-	53
D	1-2	19	35	7	3	-	-	64
e	2-3	1	5	7	1	2	-	16
b	3-4	1	2	5	1	-	-	9
i	4-5	-	-	1	-	2	-	3
t	5-6	-	1	-	-	-	-	1
s	6-7	-	1	-	-	-	-	1
	Over 7	-	-	10	-	-	1	11
	Totals	54	63	30	5	5	1	158

Exhibit D

tification? Determining the balance then becomes a single-step calculation, in which the bookkeeper starts with the last previous balance, adds or subtracts each posted item for the current period and arrives at a new balance.

Observe the simplicity which this introduces into the account-presentation. All the postings for each period are in a compact section of a single column. The date reference (month-name abbreviation) is entered only once (all the succeeding items down to the next month-reference representing entries as of the last day of the named month). A line (not a fractional space between two lines) can be used to enter the algebraic column total. The account balance is thus determined in one calculation instead of three, and no further "ruling-off" or "carrying down" is necessary.

An example of an account kept on a ledger-sheet of this type is shown in Exhibit B. In this illustration credit entries have been indicated by figures in parentheses, though in a hand-written ledger sheet different colors probably would be used (e.g. black for debits, red for credits), and in machine-kept accounts some other identification might be employed. Posting alternate colors presents no serious problem; a change from black to red ink can be made while a page is being turned, or all of the debits in a series of entries can be posted first, with all the opposite-color credits posted afterward.

In any machine-kept ledger, and in any hand-kept ledger where the bookkeeper has or can attain reasonable facility in the art of algebraic-sum additions, the potential savings in both time and space are readily apparent. For two-sided accounts the time-savings are greatest and the page-space savings least, since in the conventional ledger debits and credits usually are posted in opposite sections on the same line, and the wasted space is at a minimum when the number of debits and credits is approximately equal. For one-sided accounts the time-saving is least and space-saving greatest, for obvious reasons. For both kinds of accounts the procedure for writing in totals and balances is greatly improved.

There are, of course, numerous possible applications of the single-column principle in the design of ledger-account forms. Where the number of entries in the various accounts shows some degree of uniformity, it may be helpful to reserve a designated portion of each account-sheet for the entries of a specified period, in which case the date (month) references, and the spaces for month-end balances, can be pre-printed into the sheet. This saves all date-entries and hand-ruling, as illustrated in Exhibit C.

This approach may partly nullify the space-savings otherwise obtainable, since identical space will be re-

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Mr. Greer is treasurer of the Chemstrand Corp., Chicago. He is a member of the Chicago Chapter of SPA.

served for the entries to each account in each period, regardless of their number. Against this disadvantage may be offset the convenience of always finding the entries and balance for a given period in an identical position on the page, and the economy of not having to write in the posting dates.

Another application is in the field of multiple-unit operation, where it is desirable to maintain in the head office a complete set of control accounts for all phases of activity in each unit. In such cases the ledger account for each trial balance item (e.g. cash, receivables, payables, revenues, expenses, etc.) can be provided with a pair of columns for posting-reference and amount for each operating unit (plant or branch), with a final column for company-wide totals. This provides a self-consolidating general ledger and eliminates the arduous task of recopying the data from numerous sources onto a single sheet before company totals can be obtained.

In selecting the account form best suited to an individual situation, the bookkeeper should study the characteristics of the various general ledger accounts and count the number and kind of entries normally appearing in each. An analysis like the one illustrated in Exhibit D may be helpful for this purpose.

A single-column general ledger account form, similar to those above discussed, has been recently adopted by one large corporation, and merits friendly consideration by others. **s/p/a**

A Manager's Stake in Systems

How Systems Are Built

#4 of a series by Leslie Matthies

WE HAVE talked about how systems survey pins down and measures the present operation that you select for "overhaul."

Your systems analyst finds the start and the end of the operation. Then he finds out what it costs you. Finally, he summarizes the results you get for your money.

His next job is to analyze what he has gathered. He will sift these facts this way and that. He will take everything apart mentally, ask "why" on every operation. He will sort facts one way, then another. He'll talk to people who know the operation. He uses charts that will help him spot any missing links in the chain of operations.

> You'll get a better job out of him during this stage, if you leave him alone. No pressure. No deadlines. No other projects. Let him put his feet up on the desk if he wants to.

He tries to exercise a mental discipline during this stage. He must keep in his mind one important thing—the *objective* of the operation.

When he has the mental hopper full of digested facts, he enters the "synthesis" stage.

The solution, the new system idea, begins to form in his mind. He may reject several of these, because he weighs each against the true objectives of the operation.

But finally he gets up a plan that seems to fill the bill. He will write it up, chart it, rough out any forms. Then he'll talk to the operating people and get their ideas. He wants them to puncture it, if they can.

When he is convinced he is on the right track, that his plan will—

> Lower costs
> Give control
> Attain the operation objective

—then he will prepare a proposal for you.

He'll tell you *what* you are now doing. Then he will explain *how* the new plan will be better and cheaper. This proposal will include detailed forecasts of money reductions, personnel reductions, increased controls, and improved quality of operation.

The proposal will also explain *how* the new system will work.

If you, and others concerned, "buy" it, your analyst's next job is installation.

Your analyst will order the machine, if any. He'll design the forms, inform the people, train the operators. He'll schedule all, and he will be on hand to help out on "I" Day (Installation Day).

He will nurse the new system along. He will ease the shock of the change on your people. He will stay with it until the new operation is in full swing.

> How good were his facts? His analysis and his proposal? Did it achieve the results he forecasted? How much saved?

You'll know, because your systems men will always render you a "final report on performance." You can expect this report in from 3 to 6 months after installation. The peak of systems gains should be achieved in that period.

We haven't told you about all the tried-and-proven techniques your systems man uses. But we have tried to hit the highlights of how he works.

Our objective is simple—a better understanding between the boss and his systems man—an understanding that will be to their mutual gain. **s/p/a**

Univac riding high—moving into the Metropolitan Life Insurance Co., New York.

ELECTR

Possibilities and Limitations

INDUSTRIAL progress has not been without its cost in demands on the human being, in both the factory and the office. In the factory, however, the ingenuity of our engineers has resulted in the alleviation of some of the load on the worker through the design of industrial machines and methods to meet the pressures of our expanding manufacturing empire. A relatively high level of factory automation has been realized. On the other hand, the ever-increasing work load in the office has been met, principally, by adding to the clerical force. Office automation has not paralleled factory automation.

It is only recently that an apparent key to the office methods puzzle has been given to us by the electronics engineers. Because these engineers designed their original machines as an aid for scientists and mathematicians, there has been an interval of delayed acceptance of this new tool by the business community. During this interval there has been a successful conversion of the basic computer system. These machines have now been developed for business data processing and presently challenge our ingenuity with a promise of potential applications which stagger, but intrigue, the imagination of every systems and procedure technician.

This is an opportune time to direct our attention to the possibilities and the limitations of electronic business machines. We now know of the machines which are available or are shortly to become available. We know something, also, of the commercial installations of machines

Mr. Blank specializes in systems practice with the firm of Haskins & Sells. Additionally, he is their Pacific Coast consultant on commercial applications of electronic data-processing machines. He studied electrical engineering at Oregon State College and, during World War II, engaged in the installation of electronic devices throughout the Central and Western Pacific Areas as a member of the Army Signal Corps. He attended Golden Gate College and, after graduate work there, became a C.P.A. in California. Mr. Blank has instructed classes in accounting for the University of California and Golden Gate College. He is a member of the American Institute of Accountants and the California Society of Certified Public Accountants.

ONICS—

by Virgil F. Blank

Another authority offers his views on the potentialities of high speed electronic computers.

Completing the Univac installation at the Met.

during the past year. Further, we know of some of the applications being planned by many of the prospective users of this type of equipment. With these data we may attempt an evaluation.

Machines

In a review of electronic equipment of latest design, we shall find that the manufacturers have gone far towards solving the problems of input and output which have previously been considered a limiting factor for business applications. It was formerly true that the central computer circuits could process data at speeds far in excess of the ability of the machine to read in new data or print out fully-processed data. Because of the cost factors involved, it was felt that there should be a matching of internal speed with faster input and output devices.

Presently, all large-scale electronic systems provide for fastest input by means of magnetic tape. As tape input allows the computer to accept serially-recorded data at the rate of 15,000 decimal digits each second and parallel-recorded data at 56,000 decimal digits a second, it might be said that the input speed is fairly well balanced with internal processing speed. Manufacturers have provided card-to-tape converters as magnetic-tape-recording devices operating at 1,200 digits a second. At the present time, the retention of punched cards in an electronic system seems advisable for most users. In transcribing data from source documents the cards provide a means of mechanical verification before introduction into the electronic system; they permit the use of low-cost auxiliary equipment for preparation of the data for the computer; and they provide a link with other departments or branches using punched-card equipment. For systems using common-language paper tape there is a paper-tape transcriber which writes 200 characters a second on magnetic tape. These rapid input systems are not the exclusive means of entering data into the central processor, but are mentioned to focus attention on the engineers' answer to the demand for faster data-entry devices.

There is currently a strong feeling among machine manufacturers that the time and cost of translating source documents into machine language will lead to systems designed to originate a tape recording at the time of the origin of the source document. This method also provides for the production of a tape recording at the point of occurrence of a transaction and the elimination of some familiar types of source documents. Many auxiliary machines designed for this system are now offered for sale by the equipment companies. Still in the formula and

Left: Lockheed Aircraft Corp. engineers put their new high-speed "electronic assistant" through its paces at the Van Nuys, Calif., plant. The IBM 650 Magnetic Drum will solve guided missile design problems and process the plant payroll. At right, Montgomery Ward president E. A. Krider (standing, left) gets a demonstration of one of the first IBM "brains" in the U. S. to be used for general accounting work.

laboratory stage are document readers which will automatically translate written data into machine language.

Output of the fastest machines is also on magnetic tape. Where printed copy is desired, there is a wide choice of machines available. The most impressive of these are the newly-developed high-speed printers. These print an entire line at one time, similar to conventional accounting machines, but do so at speeds up to 600 lines a minute, as contrasted to 150 lines a minute for the fastest punched-card tabulator. One other printer, using a matrix form of print mechanism, is quoted as achieving a speed of 900 lines a minute. A recently-announced electronic printer is capable of printing over 2,000 lines a minute without limitation as to width of line. Engineers have certainly answered the challenge of speed limits.

Cost

Since the installation of an electronic system can only merit serious consideration if it is a cost-reduction device, no basis for judgment exists until a reasonably accurate compilation has been made of the present cost to do the work. Whereas a large company may find sufficient load in one department to occupy a processor full time, the cost recovery problem is more serious for the smaller company. Those companies, whose financial operations alone could not justify a large processor, may find that a combination of applications would make the machine quite desirable. These other applications may be such operations as production scheduling or material and inventory control. Perhaps there will be a desire to enter the electronic record-keeping field on a smaller scale in order to study its potential at a minimum cost.

In all instances where a compilation of present cost has been made by a prospective user of a large electronic system, the estimated savings have sounded almost unrealistic. It is of interest to note that for two very dissimilar applications for two different companies, the estimates of each were for savings aggregating close to a half million dollars a year. Since rentals for the electronic system and equivalent punched-card equipment are comparable, the savings result principally from elimination of clerical services. One of the large-scale machines will likely do the work formerly done by a great number of persons. While it might be reasonable to assume that small-scale applications will also result in material savings, they will probably not be proportionate inasmuch as the smaller systems usually require much more manual processing. Windfall savings are bound to be realized on special applications to the machines once they are installed. In one recent application of a special job to a computer, the project cost was $15,000; if carried out by human labor, it would have been $200,000—about 13 times as much.

There are now four companies offering for use large-scale data processing machines designed for general

business applications. Two of these companies and at least six other companies offer smaller electronic systems for lower-demand business use. Producers of large-scale equipment are Remington Rand Inc., International Business Machines Corp., Radio Corporation of America, and Datamatic Corp., with their Univac, 705, Bizmac, and Raycom, respectively. These are the electronic giants which have monopolized, somewhat, the limelight of publicity up to the present time.

Nevertheless, it might well be that the smaller machines will become the work horses of modern business. These machines are produced by companies which have had long experience in the office machine business. Marchant and their Miniac, Underwood and their Elecom 125, National Cash Register and their NCR 303, Electrodata and their Dataron, Monroe and their Monrobot, Burroughs and their E101, are some who have announced the operating characteristics and costs of their electronic data-processing systems. IBM also has a Type 650 machine in this class and Remington Rand has their new Univac File Computer in the smaller machine classification.

Large-scale computers are priced at from $15,000 to $30,000 a month in rental. Most of the smaller machines range from $3,000 to $8,000 a month. While these rentals may appear to limit the use of these machines to large business enterprises, it must be pointed out that there are many relatively small businesses making use of mechanical equipment costing more than the minimum figures. Additionally, there are many large installations of punched-card machines involving equipment costing considerably more than the maximum figures for electronic systems.

Special-Purpose Machines

Attention has been focused on the general-purpose electronic business machine because of its versatility and ability to meet situations formerly treated as exceptions in systems using conventional office machines. Behind this glamorous electronic jack-of-all-trades stand other electronic machines which also deserve our attention and study. These are the special-purpose machines. Presently, it is difficult to prophesy as to which group of electronic machines, general- or special-purpose, will be the proper machine when the present period of evolution has passed. The gas and electric public utility industry is sponsoring a research project at Harvard University to investigate the potentials of special-purpose equipment for applications in the utility field. Basically, the problem is one of cost. Engineers can design a simpler machine where the job limitations are specified.

There are some outstanding examples of this type of equipment performing small miracles in our business world. Air traffic control is handled on one of these special-purpose electronic computer systems. This high-speed system receives by teletype such flight facts as departure time, destination, route, fuel load, pay load, and other pertinent data. In less than half a second, the system electronically compares the facts on each flight with as many as 2,000 flight plans it has stored internally. It revises, cancels, or brings the information up-to-date and teletypes the required results back to the sending station—all without human handling.

A large wholesale mail-order firm is using a special-purpose machine to produce up-to-the-minute inventory analyses by item under conditions of seasonal and shifting demand. Ten order clerks working at 10-key input systems to a magnetic drum memory can provide accurate tallies of orders for 21,000 different items, make available complete tallies each day, and accommodate approximately 80,000 order lines a day.

Another special-purpose machine controls air-line ticket reservations. Reservations or ticket orders for any one of 10,000 flights are handled within a quarter of a second after the request is keyed on the local office machine. An entire electronic system has been designed for application to department store accounting. A central processor accepts paper tapes perforated at the points of sale by cash register attachments. The processor has been designed especially for the more efficient sorting and merging of data—which are the most common clerical functions performed on accounting information. Departmental cash balances, accounts receivable, stock control,

John Hancock associate controller H. F. Hatch examines the magnetic drum of the new IBM 650 installed at the company's home office in Boston.

and statistical analyses are all obtained at electronic speeds from the processor. These are some of the jobs being assigned to special-purpose machines.

As price competition becomes more of a factor among electronic equipment manufacturers, we will probably see more units built with pluggable components so that unnecessary hardware will be eliminated and only those building blocks included which are needed for the specific installation. With such flexibility, there would be more of a feeling among potential users that they were not purchasing capacity for performing exceptional tasks never to be contemplated within the scope of their applications.

Applications

The possibilities of money saving and the potentials for obtaining valuable information not heretofore considered practicable might be implied by examining some of the applications on the large-scale general-purpose machines.

It is of interest to observe that one of the first large-scale business applications (at General Electric) was in such a familiar area as payrolls. By choosing this application, which had already been successfully solved by predecessor business machines, it put the electronic system to rather a severe test for a beginner in the commercial machine field. It had to out-perform equipment which had been highly developed over a long period of years and in doing so had to show an over-all saving. That it has been able to do the work satisfactorily is now well known. As to the estimated savings, it is still too early to obtain conclusive comparisons.

A payroll the magnitude of this particular one, 12,000 employees, requires about twenty hours each week of the central processor's time. Of even greater interest than the payroll, are the applications contemplated for the remainder of the available time. These include:

a. Material scheduling and inventory control which will result in details of material requirements by days and weeks for any production period.

b. Processing of orders through the shipping order and invoicing stage which will have as by-products sales and cost of sales journal entries and sales analysis statistics.

c. Budgeting and forecasting on a monthly, quarterly, and annual basis which will possess extreme flexibility for introduction of estimated variances and suggested policy changes.

d. Analyzing of assembly line work-load balances and automatically preparing factory machine-loading schedules which will promote new, high-efficiency operating levels.

The coupling of all of these applications into an integrated system is not an easy task, but when completed, it should furnish management with dynamic results which could have an immeasurable effect in producing more profitable operations.

In the field of life insurance, the electronic system has shown itself to be very much at home. This has been especially true of the installation at Metropolitan Life Insurance Co., in New York. Here, the machine is in an ideal application utilizing its special abilities for processing large volumes of data. At the present time these applications may be considered to be somewhat in the mathematical area; however, valuable knowledge is being acquired in electronic machine techniques. The complete accuracy of this type of equipment has been a significant factor in its success in these actuarial applications. When the installation has been completed at Pacific Mutual Life Insurance or at Franklin Life Insurance Co., we shall learn how a medium-sized company can extend the application into all of the phases of life insurance work-policy payments, renewals, accounting, and actuarial.

It has been said by many of the prophets in the electronic field that the true potential of these machines will be realized when they are set to do jobs which have previously been considered impracticable or impossible on small-scale office machines. Production planning and associated inventory control have been mentioned as offering a fertile field of exploration for optimum electronic machine usage. Such a system has been installed by one user of a large-scale processor and similar systems are contemplated by at least four companies which have ordered large-scale machines.

Since this application offers such a potential for maximum use of this powerful equipment, a summary of the features involved might provide some idea of the possibilities for bringing the many factors relating to inventory control into a central processor and the extent of the resulting benefits.

Inventory and Stock Control

The inventory and stock control system has as its focal point the establishment on a single record of all needed data pertaining to each part. During the processing of daily requirements against this record, the protective base stock point is automatically adjusted for engineering changes. It is then tested for days of coverage and, where an order point has been reached, an order is automatically placed. This order is in the form of a production authorization card and contains all significant item data, the economical order size, the manufacturing starting date, and date the item must enter the stock. If, because of unusual circumstances, the stock should drop below the protective level, the need to expedite existing orders will be automatically indicated. Expediting cards will show the exhaustion date of the stock on hand.

One of the novel features of this system which has made it so useful is the method of determining average

daily requirements for each part. A master tape is maintained on which is indicated every feature number or assembly number where each of the parts is used and the number of times the part is used on that bill of materials. This record is continuously up-dated for all engineering changes. A sales analysis showing feature or assembly requirements and anticipated daily production figures by months for the next twelve months is processed together with the where-used tape. This yields a spread of daily requirements for all parts for a twelve-month period.

This system is an attempt to make completely automatic the record-processing necessary to inventory control. It should result in reduced inventories, better parts supplies, more accurate records, and large dollar savings in many areas of the production planning department.

Limitations

Any evaluation of a proposal for changed methods or new mechanical or electronic equipment must assemble for consideration the known limitations inherent in the proposal. We are presently at a distinct disadvantage inasmuch as the field of past experience in business applications of electronics has been restricted to such a brief period. However, there has been sufficient exposure to the problem in its pioneering stages to pin point some areas of limitation. A few of these limitations are factors which might deter entry into this electronic method; others are factors to be considered after the decision has been made to acquire such a system.

Those factors which should be considered first are the limitations imposed by the magnitude of the equipment. These are cost, reassignment of personnel, and extent of required system changes.

A substantial cost will probably be incurred before the lights go on in your data processor. Weeks of decision are usually followed by months of system analysis and programming. Since this may require the equivalent of up to 50 man-years for the large electronic processor, the cost of this phase of the preparatory work may be up to $300,000 or more. For equipment as important as this, a suitable site must be prepared. Usually, to capitalize on its advertising value, the site may look something like a show window with plate glass to accommodate all observers. The equipment functions within certain temperature and humidity ranges and hence requires an air conditioning or other cooling system. The electronic machine utilizes rather extensive floor space and the maintenance and repair equipment must also be adequately housed. Site preparation may cost approximately $150,000. While these costs, which are typical only for the largest equipment, are not repetitive, their amortization must be covered by savings during the period of use. Machine cost has already been mentioned and may be in the form of rentals or purchase price depending on the contract with the particular manufacturer. If an installation is borderline as to allowable costs, a loss of enthusiasm for electronics may occur shortly after a consideration of these cost limitations.

If this equipment results in the displacement of many persons, which may be possible in the larger installations, there may be a twofold problem. One is to establish, if possible, a policy that no personnel will be dismissed and the other is to disseminate this policy early enough to allay fears and avoid adverse effects on employee morale. Consolidated Edison, Metropolitan Life, Pacific Mutual Life, to mention a few, have made a study of turnover, attrition, and retirement rates and have ascertained that transfers, retraining and a lower new-hiring rate will completely solve this problem. It is difficult to conceive of instances where businesses large enough for major electronic systems would not be able to adjust to the limitation resulting from the necessity for personnel reassignment.

The limitation imposed by the extent of required system changes has many facets. Probably the most important is inertia. Never before has there been the requirement for such a complete change of methods in such a wide area as is implicit in the electronic approach to data processing. This is a job for imaginative thinkers having the earnest support of top management. Departmental barriers may disappear and supervisors of long service may find their departments eliminated entirely. There will be many masses of resistance, some of them of a political nature, which must be ignored for the common good of the organization.

Personnel

Another facet of this same limitation is the need for the abilities of trained systems personnel. Since the installation of an electronic system must be preceded with a thorough review of the existing method of accomplishing the proposed application, a well-trained systems group must devote full time to this project. Where the organization already has a permanent methods and procedures group, this limitation may not be a serious one. Where it does not have a systems staff, the lack of experienced personnel will present a road block to development until a selection and training program has been completed.

Still another facet of the limitation involved in an extensive systems change pertains to the interrelation of all departments of a business. Any change within the organization sets forth a chain reaction which is often complex enough to require many weeks of study by the methods analyst. These interrelations usually limit the extent of system integration.

There must be a review of the old problem of the relative advantages of centralization as opposed to decentral-

ization of the record-keeping function. This has posed a major problem to those users of electronic machines where the trend in recent years has been towards decentralization. Now we have a machine of such great capacity that it creates a need for bringing into a central point all data processing. Where there has been a costly program of establishing branch record keeping, this may limit to a large measure the amount of work which may be economically assigned to the electronic system.

The point-of-transaction recorders mentioned previously may be the answer to the problem of assembling data on a branch basis by permitting the production of a paper tape as a by-product of branch record-keeping functions. This tape could be transmitted to the central office by wire or mail for rapid conversion into the machine language. Where there has been decentralization of accounting functions because of the magnitude of the entire processing problem, there may be a real possibility that each of the decentralized branches might have its own electronic system. All branch systems would then be very closely integrated with the home office system. Although this plan is not yet in effect, there are presently at least three companies that have ordered electronic systems for use at multiple locations.

Maintenance

The capabilities of electronic machines which permit all data processing to be accomplished within the confines of one department lead to a consideration of the hazards of such a procedure. Where reliance is placed on one piece of equipment for the performance of all of the principal recording function, safeguards must be provided to insure continuous operation of the record-keeping system. For some time into the future, the electronic data processors will be rather widely distributed throughout the country so that availability of alternate emergency facilities may be limited to a few areas. This places a heavy responsibility on the machine manufacturers to provide highly-skilled maintenance personnel and complete, readily-accessible stocks of repair parts. The tolerance for unscheduled machine down time will be quite limited.

Reliance must also be placed on relatively few operating personnel for each machine unit. In addition to the problems of internal control created by this situation, there are problems of establishing working teams and training programs for team replacements. Initially, the operating team will lack experience in the use and application of the equipment. It may well be many years before electronic system experts emerge from the vast group of machine trainees.

Some limitations of the electronic system itself have already become apparent. This system is not adaptable to one-time jobs or special reports. The amount of work necessary to analyze a one-time report and program it for the electronic system is usually so excessive as compared with the results that it is not an economical procedure. Recently a bill frequency analysis was programmed by a public utility group for an applications test. It took 1,400 man-hours to program the job and ten minutes to run through the machine. As a general rule, the electronic system is adaptable only in those situations where the preparatory time will be absorbed in repetitive applications, or where the cost of preparing the report in this manner is less than by any other available method.

The use of magnetic tape as a record offers some challenge to methods designers in order to overcome its limitations. Magnetic tape presently offers maximum speed and flexibility within the electronic system. For this reason, it is the proper filing medium for such master data as customer accounts, employee records, or inventory balances. It is reasonable to assume that access to this master file data will be required on a continuing basis for the replies to customer or employee queries. The problem is how to provide ready access to the data on tape reels, especially when the machine is in operation on its daily tasks. No electronic solution has been offered to this problem other than the file interrogator on the Bizmac, which is limited, of course, to inactive reels in the tape files. Presently designed procedures utilize a conventional register printed out on a periodic basis at the time accumulated changes are applied to the master information. In the interim period, supplements to the periodic register are prepared from the daily changes.

The Tape

There is no longer any justification for qualms with regard to the stability or reliability of the tape as a record. As you probably know, in the electronic system there is a continuous regeneration of the tape-stored data. Tape files are up-dated, corrected, or amended by creating a new tape record from the combination of the old record and a change record. Tape is a full trace medium. It permits the retaining of superceded tapes for a sufficient period to ascertain that new tapes are correct before the old tapes are erased and reused. Recommended maximum tape usage is 1,400 passes through the read-write heads, which would occur in approximately 5½ years on a daily use basis. Limiting factors on tape are temperature and humidity. Ideal tape conditions are a temperature in the range of 60° to 80° Fahrenheit and from 40% to 60% relative humidity.

Unless your thinking has been conditioned for it, it is difficult to be a pioneer. This may present a limitation that can only be solved by time. Somebody is going to devise the methods of accounting control for data which is being processed at electronic speed. It will have to be a method which will not detract from the basic advan-

tages of the machine by requiring a slowdown to allow human read-out of data. It may consist of some simple procedure such as storing control totals within the main frame of the machine and allowing the electronic bits to proceed in their orderly fashion until an error is detected by the machine itself. Somebody is going to devise short cuts in programming so that this rather formidable task will be cut down to a size less challenging than at present. This may be accomplished by use of stock routines made available by the machine manufacturers from their libraries. Progress is being made in this direction.

While there is every reason to believe that there will be continued development and evolution of electronic machines and ideas, it would appear that the machines are presently developed beyond our current thinking or experience with regard to making maximum use of their potentials. This, then, is the real challenge to systems and procedures personnel. The machines are more versatile than anything heretofore offered for office use. One may well ask whether many of the partially-mechanized systems will change over to electronic systems. It all-depends on the ability and ingenuity of those responsible for system applications. The savings inherent in this new tool are being made known to management and there are now very few unreceptive individuals on boards of directors of the larger companies. The most insistent pressure will be on the systems people who will have to meet this challenge head on and solve the application problem as quickly as possible.

There are now very few valid reasons for systems people to shy away from consideration of the use of electronic data processors for accounting applications. If your company is not presently engaged in an electronics study program, is your reason good enough?**s/p/a**

Worth Reading

"Research Roundup"—*Office Executive*, November 1954.

A survey in the Atlanta, Georgia, area revealed these units of measurement being used for office work:

office work—
Straight typing
- No. of words per minute
- No. of items typed
- No. of pieces typed

Shorthand transcription
- No. of words per minute
- No. of leters taken
- No. of leters typed

Recording machine transcription
- No. of discs or cylinders

Billing machine operators
- No. of invoices
- Time studies

Bookkeeping machine operators
- No. of entries
- Volume and accuracy records
- Time studies

Key punchers and verifiers
- No. of cards
- Volume and accuracy records
- Time studies

Sorters
- No. of items
- Time studies

Accounts (or vouchers) payable clerks
- No. of checks issued
- No. of invoices handled

Duplicating machine operators
- No. of copies
- No. of impressions run

"Simple Error—Check Eliminates Invoice Proofreading"—Melville J. Lee, *Management Methods*, May 1955.

Item number and number of dozens are added on both the customer's original order and the shipping order. If the two totals agree, it is concluded that the shipping order is correct. This eliminates proofreading the entire invoice.

"Automatic Secretary Takes Orders When Offices Are Closed"—*Management Methods*, March 1955.

A telephone recording device is available which answers calls, asks the caller to leave his message, records it and says goodbye.

"Electronic Charge Accounts"—*Automatic Control*, April 1955.

A "Scandex" system "reads" data written on a tab card at point of sale and automatically key punches the information into the card. Equipment with a rental of $1,000 per month can save that amount per month for a million invoices, according to the manufacturer's comparison tests with manual key punching.

"C. I. T. Streamlines Equipment Inventory"—Henry M. Burnett, *Office Management*, September 1954.

Standard terminology used by C.I.T. for equipment inventory is:

BTL—Bottle
CAB—Cabinets
CHR—Chair
DBL/P—Double Pedestal
dia.—Diameter
DR—Drawer
ELEC—Electric
FL/T—Flat Top
GRY—Gray
GRN—Green
H—Height
I—Inside (measurement)
INV—Inventory
L/P—Left Pedestal
L—Length
LINO—Linoleum
L/T—Linoleum Top
MACH—Machine
MAHOG—Mahogany
o.—Outside (measurement)
PED—Pedestal
POST—Posture
R/P—Right Pedestal
SECTL—Secretarial
SGL—Single
STRY—Stationery
STL—Steel
STENO—Stenographic
STRGT—Straight
SWVL—Swivel
TAB—Table
TRANS—Transcriber
TYP—Typist
WAL—Walnut
w.—Width
W/A—With Arms
WO/A—Without Arms
W/T—Wood Top

"One Simple File Streamlined Our Purchasing"—Freida Kraines, *Office Management*, April 1955

A 5" x 8" rotary file was established for 2,500 items to simplify access to past purchases. Various vendors are listed at the top of the form and purchases are keyed to them by requisition number instead of purchase order since the requisition file contained the specifications and quotations. The purchase order can be referred to from the requisition, when necessary.

"How Parts Company Cut Its Inventory Time 5 Days"—Walter X. Brennan, *American Business*, March 1955.

Inventory shutdown time was reduced from 8 days to 3 by photographing 200 visible index drawers with 10,000 items instead of preparing worksheets.

(More "Worth Reading" Items on Page 19)

Starting

Procedures and Systems from the Ground Up

by Vincent P. Connolly

This is the second installment of a comprehensive article on establishing a systems and procedures department, based on Mr. Connolly's experience at the Portsmouth, Ohio, Atomic Energy Commission project.

Development of the Procedure

After statement of policy, delineation of duties and responsibilities, and general assignment of the latter to the respective sections or groups, development of the procedure becomes relatively simple. Each subdivision, in turn, has its duties and responsibilities broken down so as to appply only to itself and its components—no gaps in functions—no overlapping except the minimum required for transition.

Following the organizational set-up, we naturally come to the paper transactions: Where do records or drawings originate, what is done with them, and where do they go? Generally each paper or classification of paper must be charted individually throughout a department, described as well as presented graphically in flow charts.

Narrative treatment of an uncomplicated operation, part of a timekeeping procedure, might be presented for consideration:

B. *FOREMEN'S DAILY TIME CARD* (Exhibit 5*)

1. *Preparation*

Preparation of foremen's time cards shall be the responsibility of foremen and supervisors of manual employees. This card is an important record and should be prepared with utmost accuracy and completeness. It is the basic document for labor costs. It is evidence that certain man-hours have been expended in the perform-

*Hereafter in this example, "Exhibits" refer to samples accompanying the procedure. Here they are not included.

ance of certain definite work. [Here was included a step-by-step set of instructions for making out the card—keyed to references at the various spaces on the exhibit that formed part of the procedure.]

FOR EMPHASIS: Foremen and field supervisors are responsible for these cards. Their signatures attest to their validity.

Field timekeepers shall give any assistance necessary in making out these cards. Collaboration of field timekeepers must be available, particularly on questions of work description.

2. *Disposition*

At the end of each shift, foremen shall turn in their cards to the Basic Attendance Office.

When overtime is planned to follow after the regular 8-hour day, the foremen shall retain those cards carrying the workers concerned until the overtime is completed. Cards shall then be turned in to the Basic Attendance Office. If this office is closed, cards shall be given to the gate guard for delivery to the Basic Attendance Office as soon as possible.

3. *Use in Cost Department*

The Cost Department shall receive all foremen's daily time cards from the Basic Attendance Office after comparison and verification of them with the master labor control sheets. The Cost Department shall extend hours and labor costs and shall code work items, hours and amounts to proper cost accounts. Posting to daily cost work sheets (Exhibit 7) shall be made each day.

Each week a weekly summary cost sheet (Exhibit 8) shall be prepared from which costs shall be posted to the ledger.

Daily cost work sheets shall be filed in the Cost Department where they shall be retained for a period of thirty (30) days.

Hourly and money totals on foremen's daily time cards must balance with the corresponding weekly payroll: Hourly total for each day's card must balance with the master labor control sheet (Exhibit 6) for the corresponding day. Weekly summary cost sheets shall be filed as part of the permanent record in General Accounting files.

NOTE: The degree of experience, interest and aptitude devoted to cost coding will determine the degree of correctness of construction labor costs. From the standpoint of importance to costs, no single task ranks with coding. Given correct coding, the balance of the job is almost routine.

After foremen's daily time cards, individual time cards and daily sign-in and sign-out sheets would follow in natural and logical sequence and these forms and operations would be arranged similarly:

C. *INDIVIDUAL TIME CARDS* (Exhibit 8)
   1. Preparation
   2. Operation
   3. Use in Cost Department

D. *DAILY SIGN-IN-AND-OUT SHEETS* (Exhibit 9)
   1. *Preparation*
      a. Prepared and distributed by Payroll Department.
      b. Locations of signing stations.
      c. Individual responsibility for signing.
   2. *Disposition*
   3. *Use in Timekeeping Department*

Naturally additional references to these forms and the processing of them would be found in procedures for the other departments affected; the Basic Attendance Office, Cost Department, General Accounting Department, and even the Security Department in which latter, the guard force would be told what to do with a batch of foremen's time cards suddenly thrust upon them.

Procedure a Staff Function

Where should procedures be prepared? Where should the authority for their enactment be located? Are procedures a line or a staff function? What comprises a procedure department? What functions should it perform?

The answer to these questions is legion, but in the majority of organizations where procedures are considered the bible of the business, the procedure department is a staff unit reporting directly to, and operating under the authority of, top management. There is a logical reason for this location. First, because procedures are policy dressed in work clothes and with tools in hand. Procedures interpret policy and policy is formulated at the top. Then, no procedure is a separate entity. Each procedure directs not only the internal operation of one unit, department, division or other component of a business, but also regulates its relations with all others.

The inevitable quest for more power, wider opportunities—empire-building—dictate need for authority that has to extend beyond any single department. Autocratic or arbitrary use of this delegated authority, however, would cause animus, resentment and antagonism that would destroy the usefulness of a procedures department.

A procedure, its acceptance and its utilization has to be "sold" right down the line. A clerk can sabotage it. There is a curse attached to such terms as "efficiency," "new-fangled," "somebody's bright idea," "brain-storm," "wave of economy," as well as a few others limited to use in the men's room, that can stigmatize a procedure when it is not developed with enough diplomacy to convince the folk concerned that it was all their own idea.

The same reasons for creating the procedure department as a staff operation responsible to top management are the ones that apply to *not* having procedures established and written by the various functional components of a business. Seldom will the gears of one department mesh smoothly with those of all others. Departmental written procedures invite grasping for authority and giving responsibilities a once-over-lightly. The empire-building urge may be encouraged. Even sincere attempts may over-reach themselves—or overlook some responsibilities.

Some companies require department heads to write, or have written, procedures for their own operations, these to be used as work sheets for the procedure department. As far as they go they serve a useful purpose. They serve not only as work sheets, but their preparation gives a department head a refresher in the detailed affairs of his own department. He is given an incentive to get his own house in order before deviations get into analyst's reports.

Outside Consultants

Large organizations sometimes find it desirable to employ outside consultants to inaugurate a methods and procedures program. The advantages and disadvantages must be weighed carefully. The freedom and objectivity of the outside consultant is not always achieved. A carefully prepared plan that is merely cleverly presented, and not put in practice, is worse than useless. The cost of maintaining consultants for other than policing the procedures they establish may be more than the traffic will bear.

Sometimes the outside consultant only smokes out of hiding places workable plans that had been developed by the company's own employees.

The fact that sooner or later the company's own organization will have to take over and operate a systems and procedures department is considered by many a valid reason for working from within at the outset. On the other hand, the value of the outside consultant to help organize and make periodic appraisals of the results of the company's own work may prove highly profitable.

Use of outside consultants is a controversial subject; observation and experience seem to develop as many cons as pros. The consultant needs to be carefully evaluated. A record of accomplishment in the mercantile field may not qualify a consultant for a job in an industrial plant. If it is desirable for an employee to have acute experience in the airplane industry for instance, the same rule may well be applied to the consultant. "Business is business, whether it be a department store, a steel plant, an advertising agency, an appliance factory or a construction job," may lead one far afield in specious reasoning.

Granted the principles of all businesses are the same, it is prudent to consider what it will cost for a consultant to learn application of those principles to a different *form* of business than those in which he may have operated.

Flow Charts

It is not within the province of this article to include presumptuously any instructions for developing flow charts any more than it is to provide instructions for making job analyses or time studies. The bibliography is more than adequate. Not only is every good book on Industrial Engineering a source of information on these subjects, but there are any number of "helps," including work sheets provided by manufacturers of office and shop equipment and printers in the specialized field of forms.

Here we are concerned only with the flow chart as a necessary component of the procedure. Perhaps the reader will accept two challenges that suggest themselves to emphasize a point. The first is a simple one: Read the foregoing excerpt from the timekeeping procedure. Then chart the processes from beginning to end. Note the difference in clarity? How the chart complements the narrative?

That done, select one piece of paper that originates or threads its way through your organization or some limited segment of it. Chart it honestly as it actually *does* flow rather than how it *should flow*. In a surprising number of cases, papers will show up zigzagging and backtracking, so a chart will resemble the wanderings of a frustrated participant in a treasure hunt.

Description of operations cannot be as vivid nor as revealing as the drawn chart. Frequently the analyst will start his procedure project by compiling a set of necessary flow charts—as in most cases, he should. Hammering out the zigs and the zags will go far towards establishing an efficient procedure.

Organization of the Procedure Department

Here's where we have to take a heroic dose of our own medicine! Organization of a procedure department is not synonymous with building up another monster, creating another empire within the business. The aim and objective is to achieve smooth operation at less expense—a subtractive process rather than an additive one. Just as we stated that any procedure started with an outline of policy, a declaration of duties and delineation of scope —and limitations, so those prerequisites apply to the Procedure Department itself. All that and, too, establishment of the authority, inherent and delegated, with which the department will operate. The last named is important because procedures cross the lines of all other departments and divisions. The procedures department needs prestige—stature, no matter how servilely it performs. All concerned must be impressed with the fact that when all arbitration fails, when no common community of thought can be established—all of which should be sel-

dom—then the procedure department has the last word, the last word sanctioned by management.

Because of the diversity of policy and organization structures among various companies, no over-all pattern can be offered for general application. The very name, Procedures Department, may be a misnomer. In one large aircraft manufacturing company the department name is Procedures and Systems Division and it operates under the aegis of the production manager. Its activities extend to other departments of the business by invitation. It is a tribute to the diplomatic skill of the manager and the members of his division, as well as to the morale of the company, that clashes are few and generally of the proportions of skirmishes rather than battles or declared war. This company has so constituted its Procedures and Systems Division that it is broken up into sections of specialists under such designations as, Procedures Section, Special Studies Section, Surveys Section, Reports and Publications Section.

The section names, we think, are sufficiently definitive without going into the details of their functions. While each section has its clear-cut duties, there is sufficient flexibility in approach and diversity of specialist personnel to assemble a well-equipped team for any problem. Shop methods are not included in this division. The Methods Engineering Division, also reporting to the production manager, takes care of them.

On some assignments, however, it is not unusual for personnel from Procedures and Systems and Methods Engineering to work on the same project with immediate supervision under the division most closely concerned.

The organization is not ideal and there is talk of combining both departments as a staff function under the executive vice-president, who would also have jurisdiction over Internal Control and Internal Audit. One of the functions of Internal Control would be to police the operation of procedures.

Split Procedures

Another company, engaged in manufacture of heavy equipment, splits its procedure activities, roughly between office and shop. The Systems Department is limited to all functions within the general scope of business administration while the Methods Department is concerned only with plant operations. The former reports to the comptroller and the latter to the works manager. The ugly head of friction has popped up so frequently in jurisdictional disputes that both departments leave a no-man's land in which production control, scheduling, dispatching, expediting, and other areas of marginal responsibility are neglected. Consequently, several functions are actually performed by independent sections of the comptroller's and the works manager's departments! Can you comprehend two Production Inventory Sections? With different wage scales? One unionized and one not? Analysts come up with some fantastic discoveries!

The closest to the ideal set-up, probably the one most discussed and devoutly hoped for, but not too frequently achieved, is one Department of Procedures, Systems and Methods under one head, responsible to one independent executive. The Procedures and Systems Division would be primarily concerned with all paper operations and the Methods Division's chief responsibility would be manufacturing processes. Under one head, free interchange of personnel for special projects would be encouraged. Such structure would set up the Department of Procedures, Systems and Methods as professional consultants for the entire enterprise. The department would have authority to draft specialists from other operating departments for temporary assignments, an authority, which of course, would not be exercised arbitrarily.

(The concluding installment of Mr. Connolly's article will appear in the November issue.)

Worth Reading

(Other "Worth Reading" Items on Page 15)

"A Forms Control Program"—Arthur Clark, *The Office*, May 1955.

Describes the system used by a life insurance company with about 1,000 forms. Basic records used are (1) a functional and numerical forms catalog (2) a numerical form file (3) form design check list (4) form printing specification sheet (5) form requisition (6) form log (7) purchase record card (8) stock record card. The last four items are illustrated.

"Inventory Control System in a Steel Warehouse"—Richard Neumaier, *The Office*, May 1955.

Detailed description of how a bookkeeping machine is used to provide inventory records of 7,000 items in 126 classifications.

"Work Sampling Works for a Small Office Staff"—R. E. Heiland and W. J. Richardson, *NACA Bulletin*, May 1955.

Non-technical description of the use of work sampling with a group of 13 office employes. Purpose of the study was to determine the proportions of time spent in such activities as (1) operating office equipment (2) writing (3) filing (4) telephoning. Ten activities were used. Illustrated.

"Cost Reduction Through Mechanized Mailing"—Charles B. Lunsford, *The Controller*, May 1955.

Explains use of an inserting and mailing machine by Equitable Life Assurance Society for premium notices and annuitant checks. Briefly describes the company's mail volume and equipment in use.

"Approaching Mechanical Applications Wisely"—George H. Wadsworth, *NACA Bulletin*, April 1955.

Describes Scovill Manufacturing Co.'s approach to the problem of mechanization. Provides a detailed description of the exploratory study leading to the decision and the program prepared for the installation.

Forms Control Pays Off Early

by C. J. Costello

A drop from close to 1,600 authorized forms to less than 1,300 has been effected in less than 18 months by the establishment of a forms control program. What is more, the downward trend continues.

OBJECTIVE FUNCTIONAL FORMS CLASSIFICATION CODE

Accounts Payable	
1	Cash Requirements
2	Check Registers
3	Distributions
4	Freight Analysis
5	Petty Cash Voucher
6	Purchase Analysis
7	Remittance Statements
8	Vendor Analysis
9	Voucher Checks
Accounts Receivable	
11	Accounts Receivable Aging
12	Cash Receipts
13	Collection Notices
14	Credit Analysis
15	Customer Account Ledgers
16	Deposit Slips
17	Discount & Allowance Records
18	Revenue Distribution
19	Statements
Billing	
21	Credit Memos
22	Debit Memos
23	Invoices
Corporate	
26	Stock Certificates
27	Stock Dividend Checks
28	Stock Purchase Records
29	Stock Transfer Records
Cost	
31	Budgets
32	Instructions
33	Labor Costs
34	Material Costs
35	Operating Statements
36	Standards
37	Product Costs
38	Burden
Financial	
41	Account Ledgers
42	Balance Sheets
43	Disposition of Funds Report
44	Operating Budget Reports
45	Operating Statements
46	Regular Journals
47	Special Distribution Journals
48	Trial Balances
Maintenance	
51	Trouble Reports
52	Work Orders
Material Control	
56	Finished Goods Inventory
57	Inventory Analysis
58	Material Inventory
59	Work in Process Inventory
Payroll	
61	Bonus Data
62	Cash Payroll Envelopes
63	Cash Pay Slips & Receipts
64	Deductions
65	Employee Insurance & Retirement
66	Government Reports
67	Earnings Records
68	Payroll Checks
69	Payroll Distribution
70	Payroll Registers
71	Statements of Earnings
72	Time Cards
73	Time Sheets
74	Transfer & Rate Change Records
Personnel	
81	Absence Records
82	Employee Directories
83	Employee Rating
84	Group Insurance Records
85	Health & Safety Records
86	Hiring Records
87	Personnel Statistics
88	Suggestion Records
89	Termination Records

Exhibit I

IF YOU are wondering how soon a forms control program can be self-supporting, our experience may interest you.

Until late in 1953, such forms control as existed in our company depended upon a consecutive, numerical listing of approved forms and such amendments to forms as could be suggested without benefit of a functional forms file.

In November, 1953, we employed a forms specialist with considerable experience and skill in forms drafting, but without experience in a forms control program.

The first problem in the installation of our forms control program was the determination of a functional forms coding capable of bringing together forms having common or related end uses. After considering several possible functional codes, we adopted as a starting point, the classification used by the Standard Register Co. With slight adaptations to fit our business, it has worked out very well.

Meanwhile, our company's Operating Manual was amended to require where possible a six weeks' notice of intention to revise a printed form or to initiate a

printed form and our approval was required to make such requests operative.

A forms specification book was developed showing ordering and usage quantities in addition to data covering forms specifications and use. Analysis of the forms specifications book has not been completed to the point where it will yield answers as to where the largest costs lie. When this has been done, a basis for further savings will have been established.

While carrying on this analysis, our forms control man has consistently saved money in processing forms printing requests with the aid of the functional file. The number of authorized forms has been reduced from nearly 1,600 to less than 1,300 and is still dropping at the rate of one or two forms a week as a result of recognized obsolescence, eliminations and consolidations. Since the completion of the functional file of forms the annual savings accomplished over a 10 month period is $14,379.

These are printing savings only and do not take account of savings in stocking, handling and filing which follow from simplification of new or revised forms, forms combination and elimination. Some authorities put these savings at from eight to seventeen times the printing cost. To be fair, however, it can easily be demonstrated that no handling savings have accompanied certain individual printing savings, as for example, when the printing saving is merely a specification change, say, in the paper stock used.

Thus, without having been completely installed, our forms control program has been effective. To underline the extent to which our installation is incomplete, the sources of the savings referred to above were roughly as follows:

Forms Design Changes	$ 4,964
Form Supply Source Changes	3,049
Paper Stock Changes	1,961

Exhibit II

FORM PRINTING REQUEST

Date_____

(Attach 1 Sample of Form)

Check One:
- ☐ New Form
- ☐ Reprint
- ☐ Revision

TO: PROCEDURES DEPT.

Title of Form_____

Use of Form:

Number of Copies Prepared by User: _____

Distribution of Copies

Size of Form_____ Quantity Requested_____

Date Required_____ Estimated Quantity of Forms to be Used per Month_____

Charge Account No._____

Indicate:
- ☐ Padded
- ☐ Punched
- ☐ Assembled
- ☐ Wrapped

Send forms to:
- ☐ Supply Room
- ☐ Other_____

Other Special Instructions:

Submitted by_____ Approved_____ (Section or Department)

Approved_____ (Plants Accountant) Approved_____ (Division Coordinator)

(Do not fill in below this line)

Quantity to be Printed_____

Approved_____ (Procedures Department) Assigned Form No. _____

Mr. Costello is manager of the Organization & Procedures Department of the Marathon Corp., Menasha, Wis. He is a member of the Milwaukee Chapter of SPA.

Exhibit III

FORM SPECIFICATION

Form No. _____

Title _____

Use _____ Funct. Code _____

Form No. 635 Rev.

SIZE	WEIGHT, GRADE	SHEETS PER SET	COLOR(S)

RULING	MARGIN				COLOR INK	PRINT
☐ Vert. ☐ Horiz.	Top	Bottom	Left	Right	☐ Black ☐	☐ 1 side ☐ 2 sides

PUNCHING				PERFORATION		CORNERS	
No. Holes	Size, Shape	Position	Spacing	Position	Type	☐ Round ☐ Square	Radius

CARBON	PREPARATION			
☐ Interleave ☐ Spot ☐	☐ Pencil ☐ Pen	☐ Typewr. ☐ Bus. Mach.	☐ Spirit Dupl.	☐ Offset Dupl.

PAD	BOOK	ASSEMBLY
Sheets	Sets	☐ Snapout ☐ Fan fold ☐ Pin Wheel Feed ☐

USED BY	DEPT.	QUAN.	DEPT.	QUAN.	DEPT.	QUAN.

Other Forms Affected _____

Special Features _____ Distribution _____

Printer _____ Cost/M _____ Order Point _____

Type Reproduction _____ Annual Usage _____ Order Quan. _____

ORDER HISTORY

DATE	QUANTITY	TYPE Repr.	TYPE Rev.	REQ. BY	REMARKS	DATE	QUANTITY	TYPE Repr.	TYPE Rev.	REQ. BY	REMARKS

(Record of Revisions on Reverse Side)

Exhibit III

More Economical Runs	1,922
Finding Uses for Obsolete Stock	738
Elimination of Back Printing	241
Forms Combinations	422
Reproduction Method Changes	233
Other Misc. Specification Changes	849
Total Savings	$14,379

These figures bear out quite clearly that we have not fully exploited the possibilities of the functional forms file. Thus far it has mainly been used to yield a basis upon which to reject proposed new forms or in the re-design of forms up for revision. The functional file itself has not been combed for combination possibilities nor for systems projects that could lead to more simplified designs, more combinations, more eliminations. The best method of reproduction has not been resolved in all cases.

Our forms specifications sheets have been completed, but the costing of the normal forms quantities is not complete. We are unable at this point to gauge, for example, what color costs us, what collating costs us, perforation, padding, and so on.

With the thought that concrete examples may be of value, reference is made to:

Exhibit I Objective Functional Forms Classification Code (partial listing).

Exhibit II Form Printing Request.
Exhibit III Form Specification Sheet.

We maintain two specimen form files: one according to consecutively assigned numbers used in assigning the next number to new forms and for handling references to forms by number; the other according to the functional code (Exhibit I). The assigned form number appears on the forms. The functional coding is placed on both specimens before they are filed.

Form printing requests are compared with the functional file to see if there is an existing form that will serve or if combination is possible. The quantity requested is reviewed and, if need be, amended. The specifications are reviewed and, where required, changed. In most instances amendments are negotiated for acceptance by affected areas even though approval rests with us. Thus, the savings have been achieved in a cooperative manner.

The form specification (Exhibit III) enables us to relate form costs with specifications and when used in conjunction with the functional file, pin point areas of maximum forms cost and/or complexity.

It is hoped that this brief interim report on our forms control program will prove helpful. We hope it will encourage those who might feel that a program for control of forms is an extremely ambitious undertaking. The execution of our program is almost exclusively a one-man effort; but, even on that basis, the results have been much more than commensurate with the costs.

Our experience has been that a forms control installation pays off long before installation has been completed. **s/p/a**

Book Review

American Industries

by Stanley Vance (Prentice-Hall, 70 Fifth Avenue, New York 11, N. Y. $8.65, 626 pp.)

Reviewed by Richard W. Pomeroy, Fairbanks Associates, Greenwich, Conn.

"An economic system, whether free enterprise or planned, is necessarily a complex organism. Despite the complexity, it is imperative, particularly in a dynamic free enterprise system, that the participants . . . have some knowledge as to how this mechanism works." This statement, quoted from the preface of *American Industries* by Stanley Vance, sets forth the broad purpose behind the book: to sketch out an overall picture of American industry and then to fill in the details by looking more closely at the important component parts or individual industries. It is the author's intent to fill in the gap usually existing between the often unrealistic view of the American economic system, such as one gets from courses in economics, and the overly detailed, inside-the-woods view one obtains of the limited number of companies in which he works.

Mr. Stanley, a member of the faculty of the University of Massachusetts School of Business Administration, has taken an academic approach to his task. From the standpoint of industrial readers of the book, this is both a fault and a virtue. The fault lies in the college-text writing style (contrast, for example, Mr. Stanley's definition of the duties of the "entrepreneur" as consisting of "the determination, promulgation, activation, and enforcement" of basic production and marketing policies, with similar statements appearing in company publications) which makes for slower reading than most of us enjoy. The virtue is probably more important: an outside approach resulting in an objectivity not usually found in someone looking out at the industrial panorama from a central position of practical experience.

The first chapter of the book presents an overall look at the American industrial mechanism, stressing its growth and accomplishments. The last chapter is devoted to a discussion of the economic factors which tie the many component industries into one great operating organism. The 25 intervening chapters are devoted to the individual industries which make up the great bulk of industrial activity of the nation, Coal, Steel, Chemicals, Automobiles, Tools, Food, etc. The first part of each of these chapters discusses the background of the industry, tells how the industry works and how it ties in to the overall picture; the remainder of the chapter is devoted to an important case history relating to one of the industrial giants and intended to afford a concrete illustration of widespread problems which have confronted large companies in the past and of the specific solutions which have resulted. To each chapter is appended a short list of questions relating to the case history companies and designed to provoke further thought and appreciation of the problems discussed.

The chapter bibliography at the end of the book will serve as a guide to anyone desiring to pursue further the study of any of the industries covered in the text.

This book will afford to systems personnel a valuable (and all-too-often lacking) broad general picture of the American economy, how each of its component parts started and grew, and how they function today. Despite its somewhat weighty terminology, *American Industries* should be interesting reading for all industrial personnel concerned with the overall picture as well as with operating details of even a single industry.

Conference Leadership

by Kenneth Penny

MEETINGS—or conferences if you prefer—are an inherent part of business and social life, always have been, and undoubtedly will continue to be. Because this is true, the ability to participate effectively in a conference and more particularly to lead one, becomes a matter of real significance to all who are concerned with the function of management.

Some people seem to have a natural flair for influencing others and in fact, most of us, over a period of years, develop through trial and error, a workable method of getting people to do things we want them to do, and gaining their acceptance. This is a quality of leadership which President Eisenhower defines crisply—"Leadership is the art of getting somebody else to do something you want done, because he wants to do it."

It is more than ten years since our firm began actively to engage in the training of personnel. There had always been that elusive phantom "On the job training," which so often really means perpetuating the mistakes of the fellow you succeeded. However, somewhere about that period we began to take a planned approach to training at the supervisory level. Since then I feel we have made considerable progress and in a sense we are coming into the pay-off period because many of those who have been exposed to that training are getting into intermediate and senior levels of management.

Whether training is the cause or the effect is immaterial, it is a fact that employees are more effective, more analytical and have a much more questioning attitude to their jobs as a result of training. Their horizons have been broadened and they are less inclined to the conviction that they alone carry the company on their shoulders, without help.

Training falls into three generally accepted methods:—

1) *Informational*—which is a "pouring in" process sometimes used where it is necessary to give information to a large group at once and there isn't time for anything else.

2) *Instructional*—this is "learning by doing"—a classic example which comes to mind is a Sergeant Instructor, demonstrating the dismantling and assembly of a rifle and then requiring each member of a platoon to follow suit.

3) *Conference Method*—brings together a group of people with common or associated experience, with the purpose of pooling information and exchanging ideas under controlled conditions in order to solve individual or collective problems.

In this presentation we are going to concentrate on the Conference Method of training. A group discussion does not change the attitudes of everyone participating, but it does tend to create a broader conception of the significance of the individual experiences.

Conferences are likely to succeed when the following conditions have been carefully considered and applied:—

1. A qualified conference leader.
2. Well organized and selected groups.
3. Limitation in size of groups.
4. Proper grouping of employe levels for the purpose involved.
5. Sessions of definite length and frequency.
6. Adequate conference room facilities.
7. Carefully selected and well prepared conference materials.
8. Active interest and support of Management.

Since so much of the success of any conference depends upon the competence of the leader, what are a leader's qualifications?

He must—

1. Be a clear, rapid thinker.
2. Possess ease of expression.
3. Possess analytical ability.
4. Be impersonal.
5. Not let prejudice influence his leadership.
6. Be patient.
7. Be tactful.
8. Have poise and self-restraint.
9. Possess a sense of humor.

What are the aims of the conference leader and how does he accomplish them?

First, we should recognize that the conference leader does not pose as an expert or a lecturer. He has, in the group, sufficient experience or associated knowledge to reach effective conclusions. His task is to draw out, through judicious questioning and discussion, this knowledge or experience and direct it towards his objective.

Incidentally, it is not necessary that conferees arrive at mutual agreement. The conference is equally successful if they disagree, provided the conference has actually brought out and clearly defined the areas in which disagreement exists.

The aim of the leader is to create the type of atmosphere through which discussion makes it possible to:

Assemble the facts
Select and evaluate the facts
Get group decisions
Develop plans
Execute these plans.

To be effective, he must achieve these aims, while remaining himself in the background.

In the process of refining petroleum a catalyst is frequently used. This is an agent, such as platinum, which influences changes in the molecular arrangement of hydro-carbons without, in any way, undergoing change itself. This is almost exactly the relationship of the leader to the group. He is a stimulator or director.

A good leader usually spends more time in preparation for a conference than in the conference itself. As a matter of fact, it is suggested at least for the first few conferences, that a detailed check list be prepared so that nothing of importance is overlooked.

The leader in this preparation considers such things as:

1. Objectives to be attained through group discussion.
2. Securing and becoming familiar with conference aids, such as charts, case studies, special materials, etc. He will preview films if they are to be used.
3. Preparation of an opening talk which will lead readily into discussion.
4. Preparation of a conference outline, so as to anticipate possible responses, reactions and conclusions.

He can develop discussion and control it through:

Carefully planned questions.
Case studies, films, charts, etc.
Encourage expressions of opinions by participants.
Assembling and charting facts.
Evaluating facts.
Listing advantages and disadvantages.
Asking for examples to support statements and so on.

Questions—How and what to ask, overhead questions to the group, direct questions to individuals—ambiguous, leading, controversial, provocative questions are all most important. The effective use of questions, avoidance of those which can be answered "yes" or "no," is something which comes with practice and careful planning.

Practice and planning help to overcome heated arguments, embarrassing silences, side issue conferences, etc. I recall one conference where discussion developed into heated argument and threatened to get out of hand. The leader deliberately tripped over the chart easel, knocking it and himself to the floor. This rather radical diversion served to calm the combatants so they were easily put back on course.

While supervisory training is available in all departments of our company, I am going to restrict my comments to the marketing group in which I am most familiar.

In the initial stages we recognized two requirements—first and basically this was a training process, designed to improve the quality of supervision. Secondly, we had a wide area to cover both geographically and numerically. Consequently we aimed at developing, in each division, a nucleus of well trained leaders, capable of training others.

Management, both at head office and in the divisions, gave the project enthusiastic support. Naturally there was some resistance at the supervisory level, based on reluctance to take the necessary time from their duties. Management, however, co-operated fully in releasing selected personnel from their responsibilities and earlier resistance was replaced, with rare exceptions, by enthusiastic participation.

Because the first coverage was designed to provide leaders considered capable of teaching conference leadership techniques to others, the conferees were selected on that basis. In areas where several departments of the company were represented, the conference group might be a cross section of such departments. The number of conferees was limited to 12 or 15, and generally was scheduled to cover a full week.

After a lead-off talk by the conference leader setting out the general objectives of conference training, the leader would launch into a full scale conference, based upon some topic—probably related to personnel administration—with which all members of the group had either personal experience or association. Display cards, in attractive form, were exhibited prominently, setting out briefly the basic principles of successful conference leading.

Following the initial conference, including summarization of principles, clearance of doubtful points, etc., so the leader could assess the extent to which procedures and principles had been absorbed, various topics would be written out by the groups, numbered, thrown into a hat and then drawn by the individual conferees. Each con-

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feree, in turn, depending on the number drawn, was required to leave the conference room and prepare in a given time, perhaps 15 minutes, a brief conference outline. This he would present to the group when recalled to the room. The leader then called on the group through questioning for constructively critical analysis of the outline, so that it could be observed where principles had been overlooked or procedures disregarded.

The purpose of this procedure was two-fold—to give conferees confidence on their feet and also to drive home required principles through repetition.

Each evening some member of the group would be assigned a full conference for the next day, being required to restrict his conference within prescribed time limits, provide the necessary props, do his own charting and so on.

Each participant was provided with a check list on which he would assess the performance in detail under the following classifications, with detail under each heading—

A. Introduction

B. The Leader
Leader erratic, nervous, etc.
Lectured or expressed own opinion too much,

C. The Conference
Poorly framed questions, etc.

D. The Charts
Chart work too slow, etc.

E. Room Conditions
Lax in controlling seating arrangements, etc.
Started late without good reason.
Poor lighting, etc.

F. Generalization
The conference as a whole was excellent—good—average—poor—unsatisfactory.

Various items checked are deducted from perfect score on a weighted basis, and the result of averaging the individual assessments of the entire group tells our budding leader how he is doing.

Following the initial training conferences, we utilized the new leaders to put on the course for other supervisors as opportunity permitted. This work is repeated as required on an irregular basis so that, to the extent practicable, all supervisors and first line supervisory employees immediately below this rank have the benefit of this training.

To this point we have discussed the application on largely a theoretical basis—you may be interested in learning how we have applied it to specific problems.

Lest you gain the impression that this training applies only to clerical supervisors, I should explain to you that it embraces various vocations, clerical, sales and operational. Moreover, at times it has been feasible to mix these groups so that each gains a wider conception of the other's problems, and so is more co-operative.

We have, over the past several years, put on a number of courses, all based on conference principles. To some extent this technique has become a practical working philosophy with some of our more forward looking supervisors who recognize it as an opportunity to gain the enthusiastic participation of their staffs in better performance.

Among these several courses we might mention—

Effective Interviewing—designed to assist the supervisor in handling personnel administrations through actual practice. It has been most helpful.

Effective Letterwriting—This course, primarily designed for the assistance of office people in improving correspondence, has resulted in fewer letters, shorter letters and improved clarity of expression. Incidentally our stenographers took a healthy part in this.

Credit Analysis—Last fall we experimented with a "home brew" course based on actual case studies from our files, to accelerate the training and improve the judgment of our junior credit and collection people.

The response, and the results, have been well worth the effort.

In the sales field we have covered district management, field representatives, dealers and agents, with good results.

Babe Ruth didn't get a home run every time he came to bat—neither do we, but our experience so far has proven that training in conference leadership is a very desirable tool in the hands of management people.

When you invest capital in plant and equipment you record the value on your books, and this is a constant reminder of its worth—you provide for inspection—you make repairs necessary to maintain your equipment—above all you take pains to see that this equipment is operated by qualified personnel.

According to some American authorities, it costs in the neighborhood of $300 to hire a new employee—over his career, from "hiring to retiring" you will probably pay him 100 to 150 thousand dollars—can you afford to entrust this investment to unskilled supervisors?

In conclusion, I should like to quote from a talk recently given to your Milwaukee Chapter by Mr. Ihlenfeld of Allis-Chalmers. He said, "Remember that your reputation is built by the people you have taught to do the job for which you are responsible and that you can advance to greener pastures only when someone else can fill your shoes."**s/p/a**

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